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1 We claim:

2 1. An optical micro-switch comprising:  
3       a generally planar substrate;  
4       a first optical input/output port;  
5       a plurality of second optical input/output ports; and  
6       an optical guiding assembly operatively coupling first optical  
7       input/output port to at least one of said plurality of second optical  
8       input/output ports along one of plural optical paths, each of said optical  
9       paths being generally parallel to said generally planar substrate, the  
10      optical guiding assembly configured to moveably direct an optical signal  
11      between the first optical input/output port and a selected one of the  
12      plurality of second optical input/output ports.

1 2. The optical switch of claim 1, wherein the optical guiding assembly  
2 further includes:

3       a optical micro-element assembly including an optical  
4       microelement; and  
5       an actuator assembly coupled to the optical micro-element  
6       assembly, the actuator assembly configured to move at least said optical  
7       micro-element substantially parallel to said generally planar substrate to  
8       a predetermined position so that said optical micro-element directs  
9       optical signals along a selected optical path between said first optical

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10      input/output port to a selected one of said plurality of second optical  
11      input/output ports.

1      3.      The optical switch of claim 2, wherein the actuator assembly  
2      further includes a horizontal electrostatic comb drive.

1      4.      The optical switch of claim 2, wherein the optical micro-element  
2      includes a lens mounted to have an intended optical path generally  
3      parallel to said generally planar substrate.

1      5.      The optical switch of claim 2, wherein the optical micro-element  
2      includes an optical glass ball lens.

1      6.      The optical switch of claim 2 wherein there are at least three  
2      second optical input/output ports, said optical micro-element assembly  
3      switching said optical micro-element to plural positions corresponding in  
4      number to the number of said plurality of second optical input/output  
5      ports.

1      7.      An optical micro-switch comprising:  
2              a first optical input/output port;  
3              a plurality of second optical input/output ports; and

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4       an optical guiding assembly operatively coupling first optical  
5       input/output port to at least one of said plurality of second optical  
6       input/output ports along one of plural optical paths, said optical guiding  
7       assembly including,

8                 a horizontal electrostatic comb drive, and

9                 an optical micro-element operably connected to said comb  
10       drive,

11                 said comb drive moving said optical micro-element to plural  
12       positions greater than two and corresponding in number to plural  
13       input/output ports, to direct an optical signal between said first  
14       optical port and a selected one of said second optical input/output  
15       ports.

1       8.       The optical micro-switch of claim 7 wherein at least one of said  
2       input and output ports has plural channels.

1       9.       The optical switch of claim 7, wherein the actuator assembly  
2       further includes a horizontal electrostatic comb drive.

1       10.      The optical switch of claim 7, wherein the optical micro-element  
2       includes an lens mounted to have an intended optical path generally  
3       parallel to said generally planar substrate.

1    11. The optical switch of claim 7, wherein the optical micro-element  
2    includes an optical glass ball lens.

1    ~~12~~ A method for switching an optical signal between a first optical  
2    input/output port and at least one of a plurality of second optical  
3    input/output ports the method comprising:

- 4        a) providing said first and second optical input/output ports in  
5        an arrangement generally parallel to a generally planar supporting  
6        substrate;  
7        b) providing an micro-optical element between said first optical  
8        input/output port and said plurality of second optical input/output  
9        ports, an optical path generally parallel to said supporting substrate  
10      being defined between said first optical input/output port and said  
11      micro-optical element;  
12      c) directing the optical signal between the first optical  
13      input/output port and a selected one of the plurality of second  
14      optical input/output ports by shifting said micro-optical element in  
15      a direction transverse to said optical path.

1    13. The method of claim 12 wherein there are at least three second  
2    optical input/output ports, said step c) of directing switching said optical  
3    micro-element to plural positions corresponding in number to the number  
4    of said plural second optical input/output ports.

1    14. The method of claim 12, wherein the actuator assembly further  
2    includes a horizontal electrostatic comb drive.

1    15. The method of claim 12, wherein the optical micro-element  
2    assembly includes an etched lens.

1    16. The method of claim 12, wherein the optical micro-element  
2    assembly includes an optical glass ball lens.

1    17. The method of claim 12, wherein the optical micro-element  
2    assembly includes a mirror.

1    18. An optical switch comprising:  
2         a generally planar substrate;  
3         an actuating assembly integrated into the substrate; and  
4         an optical micro-element integrated into the actuating assembly,  
5         wherein the optical micro-element has an optical axis parallel to the plane  
6         of said substrate, and wherein the actuating assembly is configured to  
7         move the optical micro-element parallel to the plane of said substrate.

1    19. The optical switch of claim 13, further comprising:  
2         an first input/output port; and

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3           a plurality of second input/output ports, wherein an optical signal  
4   is directed to a selected one of the plurality of second input/output ports  
5   from the first input/output port by driving an actuator to move the optical  
6   micro-element within the plane of said substrate, said actuator being an  
7   horizontal electrostatic comb drive.

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